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How to increase the awareness of economic benefits and that investing in vaccines is cheaper than many other health interventions.

Improving public engagement with the formal process of the Joint Committee on Vaccination and Immunisation and consideration of its relationship with the National Institute for Clinical Excellence.

Not withstanding the complexity of the decision making process, suggestions were made about improvements to the current system to try and improve research, funding, transparency and uptake.

The Vision of 2020health.org is to formulate Health and Social Care Policy that reflects the grass-roots wisdom and experience of professionals, and promotes human dignity and equity in the provision of care.
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About this publication

This publication reflects the proceedings at the seminar ‘Modern Vaccines, Modern World’ organised by 2020health.org on July 11th 2007 at St. Stephen’s Club, Westminster. The event was chaired by Earl Howe, Shadow Minister for Health, House of Lords.

A recording was made of the proceedings, from which a transcript was produced. It was agreed in advance that the three main speakers would have their speeches attributed, but otherwise the discussion would be under Chatham House Rules. Comments on the proceedings were invited from interested parties and these follow the transcript of proceedings.

2020health.org has not altered the text apart from minor adjustments for repetition, clarity and formatting in order to produce a presentable report.

2020health.org is very grateful to Professor Elizabeth Miller, Dr Ann Lorek and Dr Mark Weston for agreeing to make presentations and to our chairman, Earl Howe. The speakers at this event came in a personal capacity to discuss the subject: Modern Vaccines, Modern World. Their contributions were chosen for their value in informing the debate, and do not represent a corporate view of any organisation. None of the speakers received any payment for their involvement in the seminar.

We are also grateful to our sponsors, Sanofi Pastuer MSD for their grant which enabled this event to take place. We are indebted to all sponsors for their funding, on which we depend. As well as enabling our ongoing work of involving frontline professionals in policy ideas and development, sponsorship enables us to communicate with and involve officials and policy makers in the work that we do. Involvement in the work of 2020health.org is never conditional on being a sponsor.

Julia Manning, Director
Dr Andrew Burns, Board Member

September 2007

www.2020health.org

People present at the meeting

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Dr Jennifer Best
Dr Andrew Burns
Andrew Farlow
Leslie Giltz
Earl Howe
Dr Nicholas Kitchin
Dr Ann Lorek
Julia Manning
Prof Elizabeth Miller
Dr Andrew Morrison MP
Doug Naysmith MP
Anne Ruglys
Dr Thomas Stuttford
Mark Weston

Researcher in Public Health, Kings Fund
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Shadow Minister for Health
Medical Director, SPMDS
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Director, 2020health.org
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Shadow Minister
Commons Health Select Committee
Head of Public Affairs, SPMDS
GP and Times Columnist
Independent Consultant to Harvard School of Public Health
Synopsis and questions for further debate

INTRODUCTION

The major contribution of immunisation to public health advancement over the last one hundred years is well recognised, but the substantial benefits of current vaccination programmes not only to public health, but also educational attainment and economic prosperity are largely underestimated. Indeed immunisation should not be viewed as a burdensome cost, but rather as an income generating investment.

This synopsis by 2020health.org of the Seminar, ‘Modern Vaccines, Modern World’, aims not only to summarise the main points of discussion, but also to highlight the wide ranging benefits of immunisation. It is vitally important that these are communicated to politicians with responsibility for health, education, the economy and international development, public health planners, and the pharmaceutical industry when considering future vaccination programmes.

The Seminar focused on three main areas:

1. The governing bodies and processes involved in the implementation and post-introduction surveillance of a new vaccination programme.

2. A grassroots perspective on the importance of vaccination and barriers to uptake in the community.

3. The economic benefits of vaccination.

2020health.org believe that the views of grass roots members have a crucial role in helping to formulate future healthcare policy. Readers are therefore invited to post their comments on the 2020health.org website.

1. GOVERNING BODIES AND PROCESS

Professor Elizabeth Miller
Head of Immunisation, Health Protection Agency

Introduction of a New Vaccine in the UK

In the UK, immunisation programmes are centrally managed (Department of Health) including funding and distribution. GPs receive incentives to administer vaccines and achieve targets. Ministerial approval is required for the introduction of a new vaccine based on advice from the Joint Committee on Vaccination and Immunisation (JCVI). The Health Protection Agency (HPA) provides an evidence base for policy and may be represented on the JCVI.

JCVI

The JCVI consists of about 20 independent specialists plus observers, representing different clinical fields and modellers involved in immunisation. Each member sits for about 3 years. Sub-groups focus on a specific disease/vaccine, operate for a finite time and undertake most of the work evaluating the relevant science and economics. The main JCVI committee reviews the papers and sub-group recommendations. The strength of the JCVI comes from its highly specialist composition and ability to provide expert peer review of very complex epidemiologic and economic models. The HPA contributes to assessing the likely impact of a vaccination programme and performs the national post-introduction surveillance.

It has been proposed that the JCVI should be subject to the external peer review that underpins NICE guidelines, but both the HPA and Chair of the JCVI believe that due to the strengths of these organisations this should not be the case. The evaluation of the cost per quality adjusted life year (QALY) of the recently introduced seven valent pneumococcal vaccine benefited from transmission dynamic models, economic models and access to high quality surveillance data including that of herd immunity from the United States which were all possible from within the JCVI and HPA.

Processes

Assessment of a vaccine for a future immunisation programme commences with a horizon scanning process by the secretariat of the JCVI of new vaccines coming up for licensure.

Evidence presented to the appropriate minister for approval of a new programme covers the burden of disease, safety and efficacy profile, the likely cost-benefit, and implementation and logistical issues. The cost-benefit analysis is complicated requiring consideration of not only direct individual protection, but also the impact of herd immunity.

2. VACCINATION IN THE COMMUNITY

Dr Ann Lorek
Community Paediatrician and Head of Immunisation, Lambeth PCT

The importance of vaccination

Vaccination programmes protect the individual, the vulnerable (e.g. children, elderly and immunosuppressed), and may provide herd immunity. Anybody can be at risk. Concerning tetanus, five doses of vaccine are recommended in a lifetime, but they can be missed and consequently the infection is now seen in drug addicts and the elderly. Travellers may be at risk of contracting polio and diphtheria in countries where they have not been eradicated. Young, unimmunised children are at risk of contracting congenital rubella from children from abroad with different vaccination programmes. WHO figures indicate a high incidence of vertical transmission of Hepatitis B in Lambeth, but protection for 0-12 month olds has been afforded as a result of screening mothers.
Barriers to uptake
The public perception of risk influences vaccination rates. Media scares continue to affect the uptake of MMR, while a surge in public demand for the Meningitis C vaccine occurred due to publicity concerning the effects of the disease at the time of its launch. Unfortunately the public have forgotten the devastating impact of congenital rubella, measles and whooping cough. Consequently service delivery can be problematic when Bacillus Calmette-Guerin (BCG) for tuberculosis is popular, although not that effective, as compared to the measles vaccine.

Organisational problems
Family education is affected by difficulties associated with the movement and tracking of the GP population (30% move/year in Lambeth) particularly vulnerable groups (chaotic families, children in care, travellers from abroad), and those who may be influenced by commercial pressures such as hospital birth packs advertising single vaccinations for MMR, and anti-immunisation websites. The capacity to listen to peoples concerns and engage them is an issue. Cost is a problem on an international level.

Reported Uptake
Computer databases (GPs, child health, payment systems) are not nationally linked, although an acceptable network exists in London. Paper flows from GP practices to central IT systems continue to be employed requiring staff training and good leaders passionate about immunisation.

Alternatives to immunisation
Death and disability.

3. ECONOMICS OF VACCINATION (for developing countries)

Mark Weston
Independent Consultant at the Harvard School of Public Health

Impact On Global Health
The WHO launched its Expanded Programme of Immunisation (EPI) in 1974 which resulted in marked reductions in mortality due to TB, diphtheria, tetanus, whooping cough, measles and polio. A separate programme completely eradicated small pox by 1979.

Economic Benefits
Disease prevention due to immunisation obviously averts medical costs, releasing government resources for other illnesses.

Childhood illness reduction and long term immunity results in better school performance leading to higher incomes in adulthood, longer working lives, and less stunting of physical growth which is particularly important in developing countries where families rely on manual labour for incomes.

Improvement in child survival rates also helps reduce fertility, allowing families to focus more of their resources on enhancing the education and health of each individual child. This generation of children will have better economic prospects and are more likely to produce a baby boom (resulting in a larger work force, who in turn go on to have less children and fewer elderly to support). Overall there is a huge boost to the economy. East Asia and Ireland are prime examples.

Traditional cost-benefit analyses mainly examine averted illnesses, deaths and medical costs, but rarely consider the other more subtle effects. A study by Bloom and Canning at the Harvard School of Public Health (Journal of World Economics, 1975) calculated the economic impact of the Global Alliance for Vaccination and Immunisation (GAVI), a comprehensive vaccination package running from 2005 to 2020 in 75 low income countries, and the cognitive impact of the Children’s Vaccine Initiative (CVI) in the Philippines. By 2020, GAVI estimates a reduction in childhood mortality from 63 to 53 per thousand live births which translates to an increase in adult survival of up to 16 per thousand and an average rise of per capita income of 2.4%. A rate of return rising from 12 % (2005) to 18% (2020) compares very favourably with most other health interventions and education. Equally children receiving the six CVI vaccines had significantly improved cognitive scores compared to unimmunised children with an estimated rate of return of 21%.

UK Support
The UK has a leading role in promoting worldwide vaccination. The International Finance Facility for Immunisation (IFFI) borrows against future aid donations in order to accelerate aid delivery today including the distribution of vaccines through GAVI. Contributions helped to curtail a yellow fever breakout in Toga this year.
Key questions

These questions relate to issues raised in the Seminar. Please submit your views on these and other relevant issues to us at www.2020health.org

1. UK Vaccination – Process

Bearing in mind the increasing number of vaccines being developed, and the importance of research to the UK knowledge economy, should the Research and Development Directorate budget be hypothecated?

Should JCVI meetings be more open to the public?

How could the process of public engagement with the JCVI be more transparent?

Would there be any advantages if the Joint Committee on Vaccination and Immunisation (JCVI) came under the umbrella of the National Institute of Clinical Excellence (NICE)?

2. UK Vaccination - Accessibility

Should members of the UK public be permitted to buy licensed vaccines to protect themselves and their families, even if they are not recommended by the JCVI for national use?

Eg for chicken pox or rotavirus?

Who would take responsibility for publicising the availability of licensed but non-universal immunisations?

Should the elderly be able to access the conjugate pneumococcal vaccine?

Should boys be given the choice of receiving the HPV vaccine?

3. International - standards and costs of immunisation

Should immunisation policies be standardised across all countries in order to reduce transmission of infections resulting from unvaccinated travellers, and to facilitate easier recruitment of overseas workers?

How could this be achieved?

How can we incentivise the consideration of the needs of and benefits to developing countries by vaccine manufacturers?


Given the lifesaving benefits of pneumococcal vaccination in children, but the prevalence of different serotypes, how can priority be given to establishing and financing appropriate manufacture and distribution programmes whilst acknowledging the financial risk?

How can governments be encouraged to invest in vaccination for public health?
Executive summary

Leading experts working in the field of vaccination came together on July 11th 2007 to discuss the role of modern and emerging vaccines in the delivery of Public Health. Under the chairmanship of Earl Howe, the major role modern vaccines could play in developing a fit and healthy population in the UK as well as tackling health inequalities in the Developing World were considered.

Three talks were given on:

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Improving public engagement with the formal process of the Joint Committee on Vaccination and Immunisation and consideration of its relationship with the National Institute for Clinical Excellence.

Notwithstanding the complexity of the decision making process, suggestions were made about improvements to the current system to try and improve research, funding, transparency and uptake.

Welcome
and introduction

Julia Manning, Director 2020 Health
Hello and Welcome! I am Julia Manning, Director of 2020 Health. Our aim is to reflect grassroots wisdom and reflect the experience of the professionals to promote human dignity and equity in the provision of care and policy development. We are a Think Tank for health and social care. I am delighted that you are all here this morning. I am now going to hand you over to our chairman, Earl Howe.

INTRODUCTION

Earl Howe, Shadow Minister for Health
Thank you, Julia. Good morning everybody. I hope this session on immunisation will be interesting and fruitful to you all. I think we all agree that if we were to look at the two or three major public health advances in the last hundred years, immunisation would rank high, next to housing and clean water and a few other advances. I think what distinguishes public health, especially immunology, is that it involves long term thinking with a focus on the prevention of disease. We all sign up to the proposition that prevention is a good thing, but government has to ask a number of questions in a climate of competing resources for all kinds of health care goods. What sorts of disease prevention is it fair to ask the public purse to fund? There is a host of vaccines emerging from pharmaceutical and biotechnology companies. What is going to be cost effective for government to fund and deliver to the public? There are questions around the regulatory process. What systems need to be in place to deal with an approvals process within government? How can a programme of immunisation be delivered, especially in relation to hard-to-reach groups, who may need it most? This morning I hope we get a better understanding of the horizons and the long term aspects of immunisation and what that involves in terms of health and economics. We will examine how the Department of Health and Health Protection Agency look at immunisation in strategic terms, and will hopefully question what emphasis we should all be placing on immunisation in the context of other health priorities.

I hope that our first speaker, Professor Elizabeth Miller, will not mind being interrupted from her breakfast if I ask her to take us through the world as she sees it, from her perspective as Head of Immunisation at the Health Protection Agency (HPA). Elizabeth is going to talk about what it takes for government and the HPA to look at a disease area as being appropriate for a potential programme of immunisation. If they do decide that a particular disease area is a runner, what is involved in the appraisal process and the process to bring a vaccine to the general public?
Governing bodies and process

Professor Elizabeth Miller
Head of Immunisation, Health Protection Agency

1. Presentation
I am not sure of how much everybody around the table is already aware of the processes that underpin the decision to introduce a new vaccine in UK. Perhaps I first ought to outline the parties that are involved.

1a. Parties involved
Vaccines that are included in our national immunisation programme are funded centrally by the Department of Health (DH) and are provided free to practitioners to give to their patients. It does not come out directly of a Primary Care Trust (PCT) budget. There is a central purchase and distribution of vaccines. In fact GPs are provided with an incentive to give vaccines. They receive an item of service payment plus additional funding if they reach a particular target. The situation with vaccines, if they are used in a national programme, is slightly different to other prescription drugs where the GP makes a clinical decision based in light of NICE guidelines on the use of the product. We have a centrally purchased and centrally distributed and centrally managed vaccination programme. The decisions about which vaccine to introduce and if it can be afforded is ultimately down to the appropriate minister, based on advice that he or she receives from a committee called the Joint Committee on Vaccination and Immunisation (JCVI), which advises the DH. The JCVI is composed of independent members, representing various constituents in the health service provision. They sit on that committee for about 3 years and provide advice to ministers. The representation is quite broad: in addition to a spectrum of clinicians, paediatricians of infectious disease, immunologists, nurses and GPs involved in giving the vaccine, there are also modellers, who can look at more abstract issues in relation to the likely impact of a vaccination programme. The HPA may have representatives on the JCVI by virtue of their own expertise, but I and other members of my department are there largely to provide an evidence base for policy.

1b. Processes
Decisions that are made, or rather recommendations because the ultimate decision is ministerial, is based on a thorough perusal of the evidence in relation to a particular vaccine. The evidence covers the burden of disease, the safety and efficacy profile of that vaccine and the likely cost benefit, based on the aforementioned areas, burden of the disease and vaccine efficacy. Implementation and logistic issues are also assessed, such as how you would incorporate a vaccine into a programme. Decisions as to which vaccine should be looked at next, is done through a horizon scanning process. The secretariat of JCVI, to which Professor Salisbury’s department provides a secretariat for JCVI, from time to time will do a horizon scanning activity. They look at which vaccines are coming up for licensure. I ought to emphasise that the licensure process is independent of a JCVI decision. I will come back to this point momentarily. They also ensure that the appropriate preparatory work is done by my department to assemble necessary evidence of the burden of disease, cost benefit analysis and so forth.

Vaccines are complicated in relation to cost benefit analysis because in addition to vaccines providing direct protection for the individual, they also have the ability to affect transmission and provide indirect protection for other individuals. This may have an enormous impact on cost benefit. For example, we have recently introduced a vaccine that protects against seven types of invasive pneumococcal disease. There are a number of other types, but these are the majority in the UK. It is a very expensive vaccine. We are giving it as a three dose schedule. The cost per quality adjusted life year (QALY) gained was greatly affected by evidence in the United States. When they introduced this vaccine, there was impact of herd immunity. When you model that, in addition to modelling the economic impact, you need to model the epidemiical impact to predict the herd immunity. This is why it is done within the HPA as rather than outside. The ability to produce these transmission dynamic models, which form the basis of cost benefit analysis, is dependent on high quality surveillance data, the epidemiology of the disease and in my view is best done as an integral part of the surveillance activity that HPA is charged with. I say this because you may be aware that that JCVI process, although it looks parallel with National Institute for Clinical Excellence (NICE), vaccines are outside that. This is due partly to the different purchase and distribution system. I think that also traditionally, this issue of needing very complex epidemiological models and economics means that it is a very specialist area. JCVI has recognised the need to ensure these models have a peer review. The human papilloma virus vaccine, which is currently being looked at in detail by JCVI, the complicated work which our modellers and economists have done is currently being peer reviewed. This thick dossier is not for publication, but to show that the work is appropriate for decision making. There are movements to bring JCVI in line with the external peer review that underpins NICE guidelines. The view of the department and the chair of JCVI is very much a specialist area and for reasons I have enumerated, are best left within the JCVI.
2. Questions and answers

Participant
Clearly, JCVI is configured perfectly satisfactorily at the moment to do its job. Do you think there may be a case in time, for changing the way it is structured because of the sheer volume of work it is called upon to do? How many people are on the JCVI?

Prof Elizabeth Miller
There are twenty members and a lot of observers. Most of the real work at JCVI is done in subgroups, finite groups for a finite duration. For instance, there is a human papilloma virus (HPV) subgroup, which will co-opt on a whole variety of experts of HPV. They will do the real nitty-gritty, detailed evaluation of the science and economics. You are right. You cannot really do that level of business in a JCVI meeting, with such a thick agenda, that only meets three times a year. The main committee of the JCVI sees all the papers and clearly is free to question any of the recommendations from the subgroups. The composition of the subgroups is very specialist, and the papers long and detailed. Thus, there is an element of delegation to the subgroups and a trust that they have done their work appropriately.

Participant
Some people seem to think it has taken an excessively long time for the HPV to be approved. Is there a reason for that?

Prof Elizabeth Miller
My group identified HPV as one of the key questions about three years ago. We needed a dedicated modeller to build the disease transmission dynamic model plus some epidemiological input to garner the burden of disease data, particularly the distribution of different serotypes of HPV. A grant application went in to the Research and Development Directorate (RDD). Nothing happened for about eighteen months. That was the period when I think the NHS found itself in serious financial difficulty. An embargo was put on approving any further grants. I had another ongoing grant for a number of years, in which I did a lot of clinical trials with vaccines looking at how they might be used in a UK situation. A renewal was held up for over a year. We were unable to appoint a modeller. In the end, I found other resources within my department to start in advance of having that dedicated post. Instead, I used other resources. As I see it, and this may not be what actually happened, the NHS was bankrupt and there was an embargo on commitment to further spending which hit the research budget. I think it is a tribute to our modellers that we managed to find somebody who was working on something else. I took him off, put him onto this and then the grant came through. That is the main reason.

Participant
It had nothing to do with a political sensitivity?

Prof Elizabeth Miller
Not at all. This is incredibly complicated modelling. Unlike other vaccination programmes, we have other interventions, namely cervical screening. There is great sensitivity about the impact that a programme like HPV vaccinations may have on both uptake of cervical screening and, as a second stage, the frequency of the screenings. There are a lot of complex questions. So far, all the modelling that has been done and published has come out of commercially sponsored groups. It is very important that these critical decisions are based on independently generated DH funded researches, although there was a lot of published material out there. Our group has been working over the weekend to meet the deadline because we should have started 18 months earlier.

Participant
Would you not be better housed within NICE given the circumstances you described with the particular example of HPV? Your assessment has run into difficulties in getting started.

Prof Elizabeth Miller
I think that is a question that would have been better directed at David Salisbury. As far as I am concerned, to do the work, you have to have access to the type of data and expertise that resides within the HPA. If the umbrella organisation that manages that process is within NICE or JCVI, I think that is the DHs view and is background politics. As far as I am concerned, I know exactly where the work needs to be done and where the expertise and access to data is. The other factor is that the HPA has national responsibility for establishing the post introduction surveillance that will accompany vaccination programmes. The evaluation of the likely impact of the programme and establishing the relevant post introduction surveillance is all part and parcel of the same package. The latter clearly resides within the HPA.

Participant
One of the great strengths of the HPA is surveillance. Other countries have not got this strength and I have always been impressed by the data that we generate in the UK. I am speaking as an academic.

Participant
That is an important point.

Participant
I was wondering if the ministry had ever not taken the committees’ advice and if you envisage that ever happening?

Prof Elizabeth Miller
The case to ministers is put forward by the DH. I would not necessarily know the detail of their recommendations. I think the big decisions, like introducing pneumococcal conjugate vaccine, introducing meningococcal conjugate vaccine, and not introducing hepatitis B
Governing bodies and process

Prof Elizabeth Miller (continued)
vaccine, and all other major decisions which would really make an impact on an NHS budget, as far as I am aware the advice of JCVI has been followed. Interestingly, when meningitis C (MenC) vaccine was introduced, the then health minister, Frank Dobson, had a famous quote which the modellers and economists have up on the wall. He said, “I decided to sod the economists and introduce it anyway.” It turned out to be a very cost effective vaccine and was a single dose catch up or a three dose infant programme. Sometimes ministers may decide to do something which does not meet the criteria of a cost per QALY gained for political imperatives. I am not aware of decisions the other way round because as it happened, Dobson was wrong. It was an illustration that the political sentiment may sometimes override the actual economic decision.

Earl Howe
I do not want to cut short this particular discussion because we will have a chance to come back to it later on. If there are any quick questions, please do fire away.

Participant
Speaking as an economist and regarding the pneumococcal, I think what is really interesting about the case is that they had to wheel it out in the United States to see this big herd immunity amongst the adult population. Prior to that, there must have been analysis and yet it turned out a lot bigger than expected.

Prof Elizabeth Miller
We were confident it would produce herd immunity because we saw that with the MenC vaccine. The MenC vaccine is a generic type of conjugate polysaccharide vaccine which works on carriage, which is the mechanism for increasing herd immunity. Our modellers built two models. One which would impact only on direct protection and the other was a model which included an impact on transmission. In order to get the parameter estimates for the second model, we had to observe the impact in the United States. You can make models, but unless you have data, they are made up models. We tried to do realistic models with parameters that are generated on the basis of data. We had already got a model set up but could not set parameters as we were given unpublished data from the US. There was not as much data generated as quickly as one would have hoped in the US. We still really do not know the impact on the non-invasive end points like pneumonia and otitis media. Those that are not aware of this vaccine, it is incredibly protective, but because there are another 80 serotypes waiting in the wings, the concern has been that they will just fill the ecological niche left by removal of the seven serotypes left in the vaccine.

Participant
The observation is that there is an isolated learning process. You have to do something to inform the decisions you are making.

Prof Elizabeth Miller
I think it was obvious that it affected herd immunity without sufficient serotype replacement to offset that benefit. Nobody could predict that until the situation was observed in the US.

Earl Howe
I know that you, Elizabeth, were at the forefront of efforts to persuade the public that scare stories about MMR were ill-founded.

Prof Elizabeth Miller
I do not like the use of that term. I was at the forefront of generating unbiased evidence about the putative risks of MMR vaccines.

Earl Howe
How well you put that. That was by way leading on to our next speaker, Dr Ann Lorek, who is a consultant and community paediatrician at Lambeth Primary Care Trust (PCT). Anne is going to give us the community perspective by looking at why vaccination programmes are so important for the community in terms of herd immunity. She will also look at possible alternatives if we did not have these programmes and what the barriers are to uptake.
Vaccination in the community

Dr Ann Lorek
Community Paediatrician and Head of Immunisation, Lambeth PCT

1. Presentation
Thank you for asking me. I have been asked to give a grassroots perspective and where I work there are not many grassroots actually. In our area we were infamous for the lowest uptake in the country for Measles Mumps and Rubella (MMR) vaccine. It has gone down from less than 50% to above 70%. That is because of hard work from my colleagues, working with practices and parents to improve that. As you said, I have been asked to look at barriers to uptake.

1a. The importance of vaccinations
I think I am probably speaking to the converted and please interrupt if this is not want you want to hear. Essentially, vaccination programmes are to protect individual and the vulnerable. For the individual there is no possibility of eliminating tetanus, for example. We are all at risk. The people who are getting it now are the drug addicts and the elderly. You have to have your five doses in a lifetime. In the current climate of immunisation, it is quite easy to miss your five doses in a lifetime. This is true for other immunisations. In addition, we might not want to travel abroad, but your children might. They may be in contact with polio, as many countries have still not eradicated polio. There is still diphtheria. In Russia there were thousands of cases of diphtheria not so long ago. So it is about protecting your children, the vulnerable, and about herd immunity (protecting people around you). This is not very popular if you have been told there is a one in two chance of getting autism from MMR. Even if you explain some of the risks of the illness, the disability and other things they may happen with measles, it is a perception of risk and it is a real problem getting that across to parents. Recently, we had two children who were severely brain damaged on a ward. They were recovering from renal surgery, doing well and about to get on with their lives. Someone walked on the ward with measles and they are now brain damaged. People have lost the impact of how devastating the illness can be.

Other ways we protect children is by vaccinating the unborn. We do not see the children who are blind, deaf and unable to communicate, the locked-in syndrome, with congenital rubella. We have not seen it to the extent which we used to and have lost that history. We are at a big risk of seeing it again in children who have not been immunised in the younger ages. Children coming from abroad may not be fully immunised and we need to realise that their immunisation programmes may not be the same as ours. We need to target these children. Congenital rubella is something we need to think about.

There are children born to mothers who have or are carrying hepatitis B infections. Where we work, according to the World Health Organisation (WHO), we have intermediary incidence with high incidence locally. The programme of screening mothers and protecting 0-12 month olds has protected hundreds of children locally and nationally from getting serious disease from hepatitis B. Those are some of the reasons why a vaccination programme is so important.

1b. Barriers to uptake
There are barriers to true uptake and barriers to reported uptake. There is a difference and they are both important. I have to put the media very high as a barrier to true uptake, as with the ongoing impact of the MMR scare. You still have reports which are very destructive. A recent headline was, “Professionals Privately Think...” We have also lost the memory of the diseases. When the MenC vaccine came in, we went to talk to families about MenC vaccine and MMR. Everybody wanted the meningitis C vaccine because they had heard about the disease and were terrified by it. They had lost the memory that when the measles vaccine came in there was just as much death and disability at that point too. We have looked after children abroad in the third world with tetanus, whooping cough and brain damage, Haemophilus brain damage with bleeding through the brain and deafness. Those illnesses are absolutely devastating. People do not have the knowledge or memory of what can happen with the illnesses. There are different perceptions about them, Bacillus Calmette-Guerin (BCG) for tuberculosis is an example. Everyone wants the vaccine, but it is not necessarily that effective. There is a problem when trying to deliver a service when there is a public demand for something which is not as effective as, perhaps for example, the measles vaccine.

There are also organisational problems. It makes a difference to invite families and explain things to them. Practices need to be organised in order to do that. In many of the practices in our area, 30% of the GP population moves every year. That is a big organisational problem which is happening in many inner-city areas. It is something which needs to be addressed constantly. It puts burden on the practices and GPs in tracking families. There are chaotic families and other people who are vulnerable such as travellers or those coming from abroad and as I mentioned before, these are children who may have missed out vaccines that need to be caught up. Those children in care, moving around multiple times, need to be accessed. These programmes need to be targeted to the vulnerable. It is a case of accessing early on, perhaps pre-birth and newborn. A hospital not very far from here had a birth pack. In the birth pack was information advertising single vaccinations for measles mumps and rubella. Do not take anything for granted. Somebody is making money out of that. It is also worth looking at the anti-immunisation websites. There is sometimes a grain of past truths in some of the stories that are reported. When I am training staff, I will ask what they would say if a mother came in and said that vaccines can cause encephalitis and can cause inflammation in the brain. Some of the staff would tell them that is complete nonsense. Parents go onto the immunisation websites that tell them this. If you look at old vaccines, some gave a sort of aseptic meningitis picture and so there was a grain of past truth there. Therefore, another barrier is our capacity to listen and engage with people. We need to acknowledge their problems because for them it is a real problem. I would agree that on an international level, cost is a problem. Vaccination and immunisation is one of the most fundamentally important programmes for health, but cost is an issue sometimes locally too because of changes in organisations. Those are some of the barriers to true uptake.

There are also barriers to reported uptake, which creates a huge headache in local areas.
Vaccination in the community

There is an organisational issue; computer systems are not nationally linked. It is not as easy as one would think to link up a GP database with the child health database. Payment systems are not linked with the GP systems and the child health systems. The payment systems are not linked with the key reporting times. Some areas have managed to overcome this, in others, people are working on it. There is an accepted London-wide solution for computing, but it is going to take a number of years before we can get all of those links into a national spine. Work that has improved reported uptake for us has been to improve information that is still depending on paper flows. Even with new IT systems we are still going to use paper flows from practices to a central IT system. That involves staff training. The reason why some people have been so successful is because you need a leader who is dogged about immunisation and a person’s person, someone who is a communicator and who is passionate about immunisation. You need a person like this in order to get the staff in practices to realise they are just as responsible with the paper as the person giving the vaccine. I think those are some of the issues that need to be tackled.

1c. Alternatives
You can summarise alternatives to immunisation as death and disability and hope you do not contract the disease. That summarises it for me.

2. Observations and questions

Participant
May I ask a question? You mentioned that different countries may have different patterns of immunisation. There is a large group of people that have moved into this country from Eastern Europe. Have you noticed an increase in any childhood diseases, such as measles, within this group?

Dr Ann Lorek
We have enough unimmunised people in our own boroughs to give us a measles outbreak. That has been predicted by the modelling. The unimmunised tends to be the more educated middle class. There are problems with the disadvantaged and moving populations, but the majority of unimmunised are the people who have responded to the media and the websites.

Participant
You touched briefly on the BCG inoculation. I deal with first world nurses from Australia, the US, New Zealand and Canada who come here to practice in the NHS. All around the world there is a huge discrepancy to give a BCG inoculation or not. The GPs in Australia absolutely say no. Canada has gone back and forth. US nurses say there no way they will give the inoculation. They come here and there is this issue of having the BCG. Now you are able to opt out of it. I have a huge problem getting clear advice on what to advise them considering they are first world country nurses and they are absolutely refusing. I do not know where to turn to get that guidance?

Dr Ann Lorek
There is clear advice that was in the Chief Medical Officer (CMO) letter that came out the year before last. The letter gave advice on all the adverse groups and about who should be getting it. It has taken time for different people to implement this. The HPA have very clear guidance about who should be getting it in different circumstances. Different countries have different policies, but there is a history behind depending on where you live. They are trying to give it in a most evidence based way to give it to those that are most at risk, who are the new born. They are the most at risk at getting the serious, difficult to diagnose and difficult to treat forms of disseminated and miliary meningitis TB.

Participant
My specific problem has been nurses who are registered nurses and that Australia in general and Canada in general and the US to a big degree now, are advising not to give the BCG to their staff nurses. Staff nurses say they are not going to do it and if they have to do it to come here, they are not going to come. That is an issue that is growing in my field.

Dr Ann Lorek
I am not familiar with adult immunisation.

Participant
As far as I understand, America does not recommend it because it is of limited efficacy and because it interferes with false positive testing and so forth. The JCVI subcommittee has looked at the evidence on balance and still recommend it should be given. The mainstay of tuberculosis (TB) control is diagnosis and treatment. If the perception is that the US do not give it because it is an unsafe vaccine, then that really needs to be corrected.

Participant
It is not that it is an unsafe vaccine. They do not want the false positive and do not want to have to do a chest x-ray every year. They are saying it is just not worth it. They are immune anyway. They work and take the risk. Doctors are refusing to give it to them in Australia. We rely on the Australian nurses working here. It has become an issue in the last year or so and it is becoming more prevalent as we are telling them they have to have it to come here. More and more are refusing.

Participant
There is a policy in the health care situation. There may well be differences in different countries, but you could not have a different policy here for somebody who comes from another country. The BCG policy is kept under continuous review. If there are downsides, and I do not think a downside would be the inability to recruit foreign nurses, but maybe chest x-rays is a downside. You could always write to the chair of JCVI, point out some of the issues and ask for it to be reconsidered.
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**Participant**
I am concerned because this is an issue coming from first world and not third world countries.

**Participant**
It is an issue because of the efficacy.

**Participant**
It is not the mainstay of prevention.

**Participant**
There is professional difference of opinion on whether it is of any use or not. The Australian physicians have gone one way and we have gone the other. That is a problem you have got to live with.

**Participant**
Am I right, Ann that the uptake of MMR has increased gradually over last couple of years. Where are we with uptake in your area?

**Dr Ann Lorek**
In the last two quarters we had 75% and 70% uptakes of MMR (an increase of 50% over the last few years). The denominator is critical and there needs to be sufficient capacity to clean up the databases. We have increased the apparent uptake, but we have also increased the true uptake. There has been continuous work talking to groups, families and parents.

**Participant**
There was a policy using MMR as a catch-up vaccine.

**Dr Ann Lorek**
In London it was a school based policy. We went into the schools and offered children the vaccine. In most areas it was a couple of thousand children of the school age in each of the boroughs. It was not as easy to do at a primary school age because you need the parents there and they would have to take time off work. The older school age is sometimes easier because you do not need the parents there. Parents of older school age children obviously still need to give their consent.

**Participant**
I would like to pick up on what Ann said about congenital rubella. There is a danger because there are those who have not had MMR but have had single vaccines. They could have missed out rubella. A teacher could have no clue they are in danger of getting rubella and might be pregnant. It could be a problem in the future. Again, people have forgotten what congenital rubella is like.

**Earl Howe**
That brings us around nicely to our third speaker, Mark Weston, who amongst many hats is an independent consultant at the Harvard School of Public Health. Mark is going to talk to us about health economics and the experience of third world countries overseas. Welcome to you, Mark.
Economic benefits of vaccination

Mark Weston
Independent Consultant at the Harvard School of Public Health

1. Presentation

Thank you. I am going to talk in particular about the economic benefits of vaccinations for developing countries, with apologies to Frank Dobson. Vaccination is one of the few undisputed international development success stories. Vaccines are developed in and then exported from the West and have had a big impact on health and life expectancy in poor countries. At a remarkably low cost, millions of lives have been saved and millions of disabilities have been averted. I am going to argue through, that the benefits of vaccinations remain underestimated. Improvements in coverage in recent years have stalled, the political will has weakened and resources have been diverted to other areas. Measles immunisation rates in Sub-Saharan Africa for example, remain below 60%. Over 60% of countries have not yet achieved full basic immunisation coverage.

Vaccinations value lies primarily with its benefits to health: averted disability and early mortality are hugely important for individuals and societies. Economic benefits matter too. If immunisation helps avert medical costs, it frees up government resources to invest and to cope with other illnesses and allows individuals to invest in more productive activities. If it helps children do better in school it will improve their productivity in adulthood which will in turn improve their health in adulthood and the health of their children. Many of these benefits are not generally covered by traditional analysis or taken account by health policy makers. The focus on the economic benefits has the potential to transform the discussion about vaccination from one about yet another burdensome cost to one about income generating investments. This is generally a good way of getting the attention of economic policy makers, who are responsible for income growth and poverty reduction in their countries. They also have the power of the purse. I am going to start with a whistle stop tour of vaccinations impact on global health before moving on to the economic benefits.

1a. Impact on global health

As most of you probably know, the World Health Organisation (WHO) launched its Expanded Programme of Immunisation (EPI) in 1974. This includes vaccines for TB, diphtheria, tetanus, whooping cough, measles and polio. Since 1974, the number of measles deaths has fallen from six million a year to less than one million. The number of polio cases has fallen from over 300,000 to less than 200,000. Whooping cough cases have fallen from three million to less than a quarter of a million and diphtheria from less than 80,000 to 10,000. Two thirds of developing countries have eradicated tetanus. Perhaps the biggest success story of all lies outside the programme and that is smallpox, which killed two million people a year until the late 1960’s. It was completely eradicated by 1979 after a huge worldwide immunisation campaign. Thus, vaccinations have had a huge impact on global health.

1b. Economic benefits

I am first going to outline vaccination impacts and effects and then will describe a study carried out by my colleagues at the Harvard School for Public Health that demonstrates some of these effects.

The economic impact works through several channels. First, immunisation averts medical costs. This is generally taken account of in decisions to use and distribute the vaccines. Second, and this is not often included, by reducing illness in children, vaccinations mean they are less absent from school and they are able to learn more effectively while in school. Good performance in school is strongly correlated with higher incomes in adulthood. Vaccine preventable disease, such as meningitis and measles can cause brain damage and weaken learning abilities. Third, childhood diseases can also stunt physical growth. In developing countries in particular, where many families rely on manual labour for incomes, this can reduce productivity at work and limit earning potential. Adults, who are vaccinated as children of course, maintain their immunity throughout their working lives. They are able to work more productively for longer. Improvement in child survival rates due to immunisation helps reduce fertility, and parents realise they need fewer children to attain their ideal family size. With fewer children, they can concentrate their resources. Each individual child receives better education and health care, which in turn improves his or her economic prospects later in life. This also increases the likelihood that a baby boom will emerge. As mortality declines, partly helped by vaccination, the number of children rises. Thus, fertility falls and the next generation of children is smaller, leaving a boom generation in between. As this boom generation reaches working age it increases the size of the work force. This generation also has fewer children and elderly to support compared with previous age cohorts and therefore has the potential to provide a huge boost to the economy. East Asia and Ireland are examples that have benefitted greatly from this demographic dividend.

Few of these benefits are taken into account in the decision making of cost effective and cost benefit analysis. Usual tools are used in analysing health interventions. They look mainly at averted medical costs, and the number and value of averted illnesses and deaths. They do not measure the vaccination against the more subtle effects I have just described. In order to take account of some of these effects, Professors David Bloom and David Canning at the Harvard School of Public Health carried out two sets of calculations. The report of the results, which I co-wrote with them, appeared in the Journal World Economics in 2005.

The first set of calculations looked at the economic impact of the Global Alliance for Vaccination and Immunisation (GAVI). It proposed a 13 billion dollar investment in vaccination in 75 low income countries, which would run from 2005 to 2020. It would extend the use of a basic childhood immunisation package, increase coverage of underused vaccines, like yellow fever and hepatitis B, and introduce newer vaccines for pneumococcal disease. We looked at the likely effect of the programme on the productivity of individual workers. We did not take into account averted medical costs or other effects, like fertility effects and
Economic benefits of vaccination

the value of reduced pain and suffering amongst survivors for example. Even just limiting it to labour productivity showed it is a very worthwhile investment. We calculated the increase in the adult survival rate in the programme; the proportion of 15 year olds surviving to the age of 60. Then we worked out the impact of that increase on annual per capita incomes, which equates to labour productivity. The 75 GAVI countries have high rates of child mortality. GAVI estimates it will reduce child mortality from 85 per thousand live births at its launch to 53 per thousand by 2020, the end of the programme. This translates to an increase in the adult survival rate by five per thousand initially and 16 per thousand by 2020. Studies accessing the impact of health on economies show that in a group of a thousand adults, for each additional person surviving from the age of 15 to 60, the income per capita rises by 0.12%. Professors Bloom and Canning therefore calculated that children covered by the GAVI programme would see an average increase of 2.4% by 2020. Vaccination has a significant impact on labour productivity and has a high rate of return. Even if you just take into account the labour productivity as the programme expands and as the costs of vaccines fall, the rate of return will rise from 12% in 2005 to 18% in 2020. This compares very favourably with the rate of return for most other health interventions and also to education, which receives a lot more investment in developing countries than vaccinations.

The second set of calculations considered the impact of a Philippines programme to increase the coverage of the six Children’s Vaccine Initiative (CVI) vaccines on the cognitive abilities of children. Childhood illness can affect cognitive development. The effects of the vaccination are not generally taken into account when deciding whether to allocate resources to vaccination programmes. We looked at a sample of 1975 children from a longitudinal health and nutrition survey conducted in Sebu in the Philippines. We compared the test score results of ten year olds who received the six CVI vaccines with the scores of the unvaccinated children. After taking into account the possibility that vaccinated children would have other advantages to improve their cognitive abilities, we found that immunisation was associated with significantly improved test scores in IQ, language and maths. As with the GAVI programme, the Sebu immunisation effort had a high rate of return for a small investment. The rate of return was calculated at 21%.

1c. UK support
I have been asked to conclude with a few suggestions for how adoption in the UK can act as a platform for tackling communicable disease globally. The UK is already taking a leading role in promoting vaccination worldwide. The International Finance Facility for Immunisation (IFFI), an initiative that was championed by Gordon Brown, borrows against future aid donations in order to accelerate aid delivery today. Last year the IFFI sold a billion dollars worth of bonds which will be repaid in five years time by donor countries, including the UK. It also distributes vaccines through GAVI and noted up an early success this year by helping to curtail a yellow fever outbreak in Togo.

The UK can also help in the vaccination agenda by investing in vaccine research. New arrangements like GAVI and the IFFI means that developing new vaccines need no longer be an unprofitable investment. If policy makers are made more aware of the economic benefits, they might increase available funds and make investment and research even more attractive to pharmaceutical companies.

The UK public also has a role to play. We need to keep taking the pills. If people here stop getting vaccinated, diseases could resurge and possibly spread abroad. Measles is a recent example of a disease that has made a slight recovery as vaccination rates have declined. The decline in measles vaccination is driven of course by the MMR scare. There is some anecdotal evidence that parents in developing countries have become aware of the scare. Measles kills over a thousand children a day in the developing world. The effects of a decline in uptake there could be catastrophic. It is vitally important for the public health community here to communicate the benefits to the UK public and media and to address the arguments of the anti-vaccine lobby.

Finally, communicating to national and international policy makers is also vital. Unlike many other investments, immunisation is cheap and it has proven to be effective. Its impact on global health has been huge, and if you factor in the economic benefits as well, investing in it looks even more attractive.

2. Observations and Questions

Earl Howe
Thank you Mark, for your fascinating talk. There was so much there. Are there any questions?

Participant
I am interested in economists’ arguments in spending state money. It is persuasive. The difficulty comes of course when you are trying to persuade people that hold budgets to part with cash. I am sure you come across this all the time and it must be a source of constant frustration, but how do we do it realistically. Frankly, most politicians around here are interested in departments that spend money rather than make it. When they get into government they are there to restrict spending to a large extent and will be defensive of their budgets. Yet, you are making the argument, very persuasively, that spending on this area is vital. This is the reason why I am perhaps interested in JCVI becoming part of NICE. NICE is quite good at cost benefit analysis. The argument that you are making is clearly that we need to spend money on vaccines because they are cost effective. Yet we are not doing so in the way we ought to. I am heartened by the IFFI and it is not like me to be nice about the current Prime Minister. I did not know about that and it sounds as if that is a good thing. I am just trying to get your view on how to break down silo mentality, which means that perhaps we do not spend in areas where there could be economic benefit.
Economic benefits of vaccination

Mark Weston
You mentioned restricting costs and that vaccinations are very cheap compared to most health interventions. That should be an argument in itself; you invest in vaccination and you have much bigger health impacts than if you spend a lot of money on various other health interventions. There are not many studies showing these more subtle impacts of vaccination. There is clearly a need for more research in that area. The way to persuade people is to present and make clear that they are getting a big bang for their buck.

Participant
With other interventions you could do some kind of analysis for certain investments. For example with malaria drugs it is a no brainer, yet the investment of money in the roll out policy seems very weak.

Participant
If you spend money on vaccines in the developing world, those vaccines get through to the patients. If you spend it on drugs, for example malaria, it leaks. Local people get the drugs and then they flood it so it gets back into the private sector. If you have state employed people giving out vaccines, there is no way it can be sold to anybody else. With regards to the pneumococcal vaccination as a conjugate vaccine, we forget that pneumococcal diseases kill one third more than malaria does throughout Africa. It is a more lethal disease in its various forms and the death rate from pneumococcal disease is much higher in children in Africa and the rest of the third world than it is from malaria. The vaccine can be comparatively cheap compared with a big anti-malarial campaign and it is much harder for people to steal the proceeds of our “generosity”.

Participant
In the case pneumococcal, can you explain the intervention you are talking about?

Participant
What we should be doing in Africa, for instance, is vaccinating as many of the children as possible. We should be contributing to or paying for a scheme in these countries. For example, someone would give the vaccine to a doctor who is a state employee. He would then go round his patch and give these children three jabs at different times. Moreover, pneumococcal is very confusing. People guess they are only protected from pneumonia, but they are not; they include septicaemias, meningitis, deafness and ear-troubles, peritonitis. Right across the board, it is a common organism which occurs. You increase herd immunity if you give the new vaccine and money is not wasted. If you give money for diabetic treatment, another big problem in Africa, it does not get through to the patients. It is sold by the hospitals to distributive agencies and private pharmacies. The poorer people cannot then buy the treatment because they do not have the money for it. If you actually give someone a jab, you give that person protection, possibly for life.
General discussion

Participant
There is another point to be made about pneumococcal infections. We still use the other vaccine for older people. Pneumococcal infections are common at both ends of the life cycle. In England, we say people over sixty five, and in America over fifty five, are more liable to get these diseases. When a person is over sixty five we give them a pneumococcal immunisation, but it is not as effective and probably wears out after seven or eight years, possibly as early as five years. I am not certain of the argument against giving older people the conjugate vaccination to improve herd immunity from the other end of the age span?

Participant
At the Health Protection Agency (HPA) we anticipated that question. A couple of years ago, we completed a trial looking at the response of a pneumococcal conjugate in the elderly. The coverage is only 50% in terms of the percentage of all circulating serotypes in elderly people. That is the next question - should we be using the conjugate for the older age groups - and we do try to anticipate. In addition to doing the cost benefit analysis, we do trials to anticipate the potential use of a vaccine that the manufacturer might not do.

Participant
Is the conjugate for the elderly available now if people ask their GP for it?

Participant
It is probably not available. It is not yet licensed. If you are using a vaccine outside its licensed indication, that really ought to be on the basis of expert opinion, namely the expert opinion of the Joint Committee for Vaccination and Immunisation (JCVI). Licensing the vaccination for older age groups has not yet been considered. There may be such a herd immunity effect for vaccinating the children against the seven serotypes that the additional benefit may be relatively small for direct protection when giving the elderly that vaccine.

Participant
Are you going to introduce the thirteen serotype conjugate vaccine?

Participant
Wyeth, one of the manufacturers, is producing such a vaccine. It will be reviewed to be licensed in a few years. The use of pneumococcal conjugates in developing countries is problematic. It is a very expensive vaccine. You need sufficient money upfront to buy it and get its benefits. For instance, there has been an interesting initiative funded by the Gates Foundation to bring affordable, meningitis A vaccine to the meningitis belt, which specifically targets serogroup A meningitis. This vaccine will be affordable, that is less than half a dollar a dose. None of the commercial companies are going to produce such a product for that price. This initiative has generated a producer, Serum Institute of India, which produces a large quantity of vaccines for the developing world. The company has been given the technology and the means to produce this vaccine on a contract. That is the way forward.

There is a lot of advocacy for pneumococcal conjugates in the developing world, but there is no manufacturer that would be able to produce a product that would be cheap enough to buy to gain those benefits that have been outlined.

Participant
That touches on an important point: tier pricing, whereby first world countries pay a relatively high price for new technologies, such as pneumococcal conjugates HPV vaccine. In turn they subsidise the availability to third world countries at a much lower cost. This might not be available in third world countries at the same time as first world countries, but further down the line. Traditional health economic analyses do not incorporate tier pricing, yet policy makers recognise that this subsidising effect is an important responsibility in first world countries. First world countries need to introduce vaccines as such that they are used in large quantities, to recoup the development costs and the infrastructure costs of production. Third world countries will subsequently benefit.

Participant
That is what happened with Anti-Retroviral Drugs.

Participant
You also touched on an important point about accessibility. In this country, it is very difficult, if not impossible, for a patient to access vaccines that are not universally recommended. For example, chickenpox vaccine, which is licensed and in some countries is universally recommended, is available here. If a patient wants their child to have the vaccine, it is virtually impossible for a patient to get the vaccine if they go to the GP. Even though it is available and the GP can purchase it, there is no means to reimburse it. GPs rightly follow the JCVI recommendations to the letter. If it is not universally recommended, GPs interpret that as meaning no one should have it. Therefore vaccines are then virtually impossible to get on the NHS, or privately as GPs cannot prescribe drugs privately to their own patients.

Participant
Why should it be any different from people who are from this country and who travel to various countries overseas where diseases are endemic that are not here, such as yellow fever?

Participant
There is a mechanism for things like yellow fever which you have to pay for. There are other travel vaccines which the NHS does provide, for example Hepatitis A.

Participant
Yet you are talking about a vaccine that has not yet been licensed.
General discussion

**Participant**
There is a broader issue that it is very difficult for people who wish to access the vaccines unless they are universally recommended, even for those people who are prepared to pay for the vaccines to protect themselves and their families.

**Participant**
Is HPV licensed for use in young boys as well as young girls? We only immunise the girls and not the boys. There is a pool of infection which is likely to affect the older age group which has not been vaccinated. Furthermore, we always think of HPV in relation to cancer of the cervix, but it is also a factor in all the other below-the-belt cancers, cancer of the amn, cancer of the penis, and above the neck cancers too, of the head and neck. Instead of spending more money on head and neck cancers, we should use the vaccine right across the board to get rid of the disease.

**Participant**
Fortunately head and neck cancers are very rare. From the cost per quality adjusted life year (QALY) gained, virtually all benefit from the HPV vaccines against the cervical cancer targets comes from direct protection of preventing cervical cancer in women. It will bring little additional benefit if we double the cost by vaccinating men. In fact, the cost per QALY gain goes up hugely. The modellers have also looked at the impact of the quadrivalent vaccine. There are two vaccines. One has two serotypes that prevent cervical cancer and the other has an additional two serotypes that protect against genital warts. You get a lot of benefit from vaccinating women and protect men against genital warts, because they have a transmission dynamic model. It all comes down to how much benefit you get for this amount of spending and how that compares with other health interventions or treatments. If you have a safe, effective vaccine, everyone will want to get it because everybody might potentially benefit. However, there are limited resources available to spend on health care and competing health care with other areas of departmental spend. The cost benefit analyses have to be rigorous and take into account additional benefits you might get from herd immunity. The analyses must also be based on very robust data about the burden of the disease. The HPV analyses have not shown the additional benefits when vaccinating men against penile and renal cancers that would merit the huge addition of cost.

**Participant**
Including head and neck cancers?

**Participant**
As I said, fortunately they are rare compared to cervical cancer.

**Participant**
This touches on some of the policy challenges we are about to face in the future. An important issue was raised that we have vaccines which are licensed. Some fall into recommendation, others do not. If you are not within a licensed age you cannot access vaccines and you cannot access vaccines that are not part of the national recommendation. As potential policy makers, how are we going to make these vaccines available? As economists, what sorts of decisions are going to be made? If you look into the future, you have vaccines that may be part of treatment programmes and vaccines for more specific diseases that are not necessarily contagious. Shingles vaccine, for example, might or might not achieve recommendation. How do we enable people who would like to access that vaccine, and other similar vaccines, in the future? There are going to be lots of demands for HPV’s and you will get boys and men demanding it because it is within license but outside of the national recommendation. There are policies which people at a local and national level are going to have to begin to consider.

**Participant**
It is a double edge sword to provide access to vaccines to those who can afford it when they are not nationally recommended because it increases inequalities. If the rich can afford to buy rubella vaccine, as is happening in some developing countries, you reduce the transmission of the virus in the population. Those that cannot afford the vaccine get infected later, because there is less rubella about. Therefore, the burden of congenital rubella, although overall may be reduced, is specifically concentrated on the proportion of the community that cannot afford the vaccines. One has to be aware of paradoxical effects; the ones purchasing the vaccine which affect the transmission dynamics are those that are advantaged in the population.

**Participant**
If we look towards the future, there is an impact of genetic risk factors. A lot of research is looking at people’s predisposition and genetic biomarkers. Is that not going to increase health inequalities because inevitably again, it will be the better off who will be able to afford the analysis and tests that are needed to identify whether they have a particular susceptibility. Do you think the research is going to be able to identify cohorts in particular cultures that are more susceptible? Then you will not get health inequalities because there will be a roll out to the necessary populations.

**Participant**
I do not see that genetic testing of populations or individuals is really going to improve the use of vaccines? Anybody can get rubella. Anybody can get measles. It is not just a susceptible subset of the population. Any mother, from any social stratum or ethnic group, who gets rubella in the first ten weeks of pregnancy, has a damaged child. We are not into biomarkers. We are not talking about strange, idiosyncratic diseases that strike people down without any understanding. We are talking about interventions that protect anybody. Anybody is susceptible and anybody can benefit.
General discussion

**Participant**
When you are looking at the epidemiological and economic modelling for vaccines, are you doing a comparison of disease? For example with mumps, did you look at the possibility of not having this vaccination or application universally?

**Participant**
The base case scenario is that you identify the burden of the disease and the cost in a non-vaccinated situation. You then do a sensitivity analysis by looking at various uptakes, various vaccine prices and at the parameters, because there is uncertainty sometimes about the parameter estimates. It is a substantial body of work looking at each cost per QALY gained. That is the final common economic expression that enables a comparison of different vaccines or different interventions. Getting QALY data is quite difficult. Is it worth preventing two days diarrhoea with a rotavirus vaccine? I think there needs to be more research on QALY measures that are robust. The methodology is always to compare various vaccination scenarios with doing nothing.

**Participant**
Perhaps the economists can answer whether they think the cost per QALY is an appropriate measure for a preventative intervention, like a vaccine compared to a treatment. There are political issues here. Political decisions often have a short term view, perhaps five years. An HPV vaccine for example, might accrue some benefits quickly but most benefits would take fifteen or twenty years to accrue. I think the discounting over that period negatively impacts on the analyses of vaccination programmes compared to traditional drug treatments.

**Participant**
People working in the world of foundations and potential sponsors talk about HPV, and think it is such a long way off for any impact or effect when they look at the cost and the prices. They do talk about it, but there are other pressing issues on the agenda. This is largely because of the rate of time discount applied on welfare as such long horizons. The current pneumococcal vaccine that has been licensed is a seven valent, implying it was never set up with the intention to supply to developing countries. The valents and the size of the production facilities were set with the US market in mind. There are currently also problems with the yield. It costs about $60 per dose and if somebody from a developing country comes along wanting more of the vaccine, it has a marginal impact if they sell it. One Foundation has another initiative to try and develop a protein based pneumococcal vaccine which theoretically will enable wider serotypes coverage (well, it would... but the issue is that it might also therefore be cheaper to manufacture). It raises the issue of whether you wheel out the expensive thing first, even though it’s adapted for a particular market and has serotypes for that market, or whether you wait for something that is more appropriate later. It also raises issues about cost and pricing.

**Participant**
Comparing vaccines is one thing but in the NHS, we are comparing between vaccines and drugs and other interventions in trying to develop a level playing field whereby everything can be compared.

**Participant**
We are looking at the way National Institute for Health and Clinical Excellence (NICE) makes its decisions and what cost per QALY means. QALY as defined by NICE, for the normal range of drugs, is very different from what you are doing with vaccines. I do not think you can compare them properly.

**Participant**
I thought the whole point of a QALY is that you can compare apples and pears.

**Participant**
Why do you say it is different?

**Participant**
A QALY is used to work out the cost of someone getting a drug, sometimes for the rest of their lives. With vaccinations, as someone pointed out a minute ago, you give a dose maybe three times and that’s it. Working out the cost is going to be very different statistically. For instance, you give a cancer treatment that lasts years.

**Participant**
But a cost per QALY analysis is supposed to encompass all of that.

**Participant**
It is, but if you are estimating what it means for a population and take something such as herd immunity into account, obviously people will tell you this is a QALY. However, it is not comparing like with like. I do not think there is any way you can compare like with like because the assumptions are so great. A drug company closed down the developments for TB in third world countries because they thought it was not going to be profitable enough. Making decisions like that is very different to working with a cancer drug, and other similar treatments, which gives value for money for the National Health Service.

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1. Clarification: Once the plant is built, they can sell all marginal units at $60 per dose. There is plenty of demand given the supply. Hence developing countries can’t compete for the supply. Now, had the serotypes been targeted to also include the poor and have the plant size been set that way, then some form of tiered pricing would have enabled the poor to get access.
General discussion

**Participant**
The discounting we use is the one recommended by NICE. The methodologies for estimating QALYs use the same methodologies, whether it is suffering averted with a treatment or whether it is prevention. With cancer drugs, there is a lot of spending by a small group of people over a long period of time whereas a vaccine is a large number of people, three times over. The actual components of the costs and the QALYs may well be different. You should be able to put our economists’ analyses side by side the cost per QALY analyses that come out of NICE, albeit that the actual dynamics of the situation are different. They should be comparable.

**Participant**
The course of action for the moment with Alzheimer’s drugs is dependent on how NICE actually makes its calculations about QALYs. They are refusing to make public, so far, exactly how they arrived at these decisions.

**Participant**
A QALY is often determined by getting doctors together to discuss how bad they think the disease is. How bad is it for parents to have a child in hospital for two days with diarrhoea?

**Participant**
That is for vaccines?

**Participant**
Yes. Diarrhoea is a rotavirus. There are other methodologies. Our group has been trying to get better data. I am sure the economists know more about those methodologies. What data do you use if it is not QALYs?

**Participant**
You end up with a figure of QALYs: it is thirty thousand pounds. Primary Care Trusts only tend to use about twenty thousand. After a decision has been made, PCTs use a much lower value per QALY than NICE has recommended. That is variable depending on many things, for example, where the money is coming from.

**Participant**
A punch in the budget has a big hold.

**Participant**
I would like to ask a practical question. I am currently undertaking an independent assessment of the TB vaccine investment case for the Gates Foundation. As I go through all the figures, one of the things the analysis presumes is that even for a 70% efficacious replacement vaccine, there will be a massive uptake in the rich markets. I want to get my head around that. If you strip the rich market out of the figures or make it much less so, the market (and hence investment) value collapses. What do the models say about TB vaccines that are not 100% efficacious?

Comparing vaccines is one thing but in the NHS, we are comparing between vaccines and drugs and other interventions in trying to develop a level playing field whereby everything can be compared.

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Participant
When we do vaccination programmes in this country, we have a target uptake to achieve. Rather than introducing the vaccine and then seeing what the uptake is, we have an implementation strategy. The information and the implementation strategy are designed to achieve that uptake. It is a dependent variable, rather than an independent variable, in the model.

Participant
A Scottish doctor has developed a vaccine that is DNA-based.

Participant
There a lot of candidates for DNA vaccines. Some are in phase one. New developments in vaccines that are DNA and anti-idiotypic vaccines are all fancy. We still use the basic antigens, poly-saccharine proteins, killed organisms or attenuated organisms and sometimes antigens produced by genetically engineering. The science has promised a lot, but most of the effective vaccines are based on the old technologies.

Participant
Presumably the cost of the vaccine will come down dramatically?

Participant
The price of a vaccine is determined by all these additional factors, over and above how much it costs to produce; recouping development costs, having the ability to finance a two tier system. Price and cost are therefore different. I do not know if it is much cheaper to make a hepatitis B vaccine from yeast than plasma?

Participant
It probably is.

Participant
The production costs of making it are trivial at the end of the day in relation to all these ancillary costs and production and marketing.

Participant
You do have to spend money on marketing.

Participant
Unless the manufacturers make a profit, none of us would have any vaccines. Often the debate is whether the UK should have its own manufacturing capacity? It may involve big pharmaceuticals who will struggle without having the public sector funded.
You mentioned that JCVI is becoming more NICE-like. You gave the example of having your model peer reviewed by an external party. NICE has a means for a third party to engage with the process, be it someone from the industry, patient groups or professional bodies. At the moment JCVI does not do this. Do you think this is a good thing or that may be used in the future?

I think NICE is having their meetings open to the public in future.

Their decision meetings are public. Even before that, you can enlist as a stakeholder and give your input into the process. The United States equivalent, the American Society for Investigative Pathology (ASIP), hold their meetings largely in public.

The issue of whether JCVI meetings should be open is debated regularly at JCVI. There are various pros and cons in a process where the public can engage with the decision making.

There are no means at the moment for manufacturers to submit data.

It can be solicited by the JCVI. It is seen as a closed shop: people on the outside do not understand how it works and manufacturers are not invited to meetings. Great efforts have been made by the HPV subcommittee group and the committee to ensure we have the most up-to-date, unpublished information from the manufacturers for the committee to review.

What concerns me is that public engagement is not part of the process. Material is put in adhoc and you ask for things that you feel are relevant, but there does not seem to be any formal means for patient groups, the British Medical Association (BMA), or whoever might want to contribute, to give their input in the decision-making process. You should have a process where anyone can enlist as a stakeholder and their issues can be ignored or taken on board, depending on the overall view of what is submitted.

I think that is a question you should raise with the chair of JCVI. Other than having open meetings, where you could engage people, who by themselves do not necessarily have an expert view, what would you do? We do have a lay-member to bring the view of the average punter in the street. The fact is that she has a degree in biology and is a well educated medical journalist. That aside, she does bring a different perception.

What would you envisage as a process? The manufacturers frequently come to the secretariat at JCVI to produce their wares, show what vaccines are being developed, and that informs JCVI agendas. JCVI would ask for data to be submitted in confidence. Any member of the public or member of the health professions can write to the chair of JCVI suggesting topics for inclusion on the agenda. I am not sure how to make it more open?

Those things are possible but they are not a formal part of the process.

Is there a concrete suggestion about a procedure that would allow more formal involvement of stakeholders other than the Department of Health? The committee itself is meant to represent those factions of society that would have an interest in the outcome. Any committee has a representative group that is reflected in the committee membership.

The problem is that individual committee members are reluctant to engage with unconventional [inaudible] industry because they might be perceived wrongly.

There is always this issue about conflicts of interests, and perceived conflicts of interests that bedevil more open dialogue with manufacturers.

If it was part of the overall process there would be no issue with conflict of interest. I am not advocating open meetings. There are pros and cons and the cons might outweigh the pros. Yet it would be beneficial if people were able to feel like they could get involved in the decision-making process.

It is about a process of engagement.

I think this is something that parliamentarians could take up easily and explore.
Closing remarks

Earl Howe
It is with apologies that I need to leave. I have an unbreakable engagement and I am sorry to leave the discussion at this point. Therefore, I will wind up the formal proceedings by thanking all our speakers, Professor Elizabeth Miller, Dr Anne Lorek and Mark Weston.

They opened up a wide ranging discussion which I think benefited everyone. I would also like to thank Julia for organising this event and putting in a great deal of work.

Julia Manning
Thank you all for coming and making it possible. To reiterate, thank you to all the speakers for coming, and please do carry on talking.
The discovery, development and successful delivery of vaccines appropriate for developing country contexts is also an increasingly highly nuanced endeavor. For example, there are 90 serotypes of pneumococcal, but the first available pneumococcal vaccines target the serotypes most prevalent in rich world markets. They have turned out to be relatively expensive to manufacture and use in poorer countries for a combination of reasons. These include poor production yield, inadequate production capacity on account of the originally targeted market and bulky packaging that eats up cold chain capacity in developing countries. At current rates, between today and 2030 approximately 25 million children will die before their fifth birthday on account of pneumococcal, and yet significant new funding into a vaccine-based strategy will, according to the calculations of those involved, leave about 98% of those deaths still to take place. Saving many more lives clearly requires much more attention to this nuance.

Any early malaria vaccine will likely not be fully efficacious and long-lasting and will need to be used as part of a package of interventions, and may not be appropriate in many settings. The degree of uptake and success with a TB vaccine will also be dependent on whether it is a replacement of current BCG vaccine or a booster, or a combination of the two, and will depend on issues such as the ability to separate out latent infections from the uninfected, on whether or not a big catch-up program is justified, on vaccine efficacy, on the build up of resistant forms of TB, on the availability and quality of new TB drugs, and so on.

The benefits of vaccination are clear. But there are dangers of tarnishing that reputation and policy interest in vaccination strategies by the use of blunt instruments that ignore the layers of issues affecting success, and hence the appropriate design of instruments to bring about success. Some new kinds of incentives are needed – for example instruments to cover the financial risk of manufacturing plant, and better handling of demand forecasting – but designing them as blunt instruments regardless of this underlying technical and practical nuance could have its counterproductive side too.

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The ‘upstream’ discovery and development issues for a range of proven and effective vaccines have been solved, and yet immunization coverage rates in a number of developing countries are still highly unequal, both across countries and within countries. This alone should tell us that success with vaccines is not only about getting the upstream ‘R&D incentives’ right, but must depend on a huge range of downstream issues too.
Speaker Biographies

Prof Elizabeth Miller
Professor Elizabeth Miller is Head of Immunisation at the Health Protection Agency. She was appointed OBE in the New Year honours of 2003 for her services to Public Health Medicine.

She was at the forefront of government efforts to convince parents that the controversial MMR vaccine is safe after Andrew Wakefield’s unfounded claims; took a leading role in the introduction of the meningitis vaccine in the UK and continues to lead on cutting edge research into new vaccines and gene functions.

Dr Ann Lorek
Dr Ann Lorek is a Consultant Community Paediatrician and Lambeth PCT Immunisation Coordinator. She works with Jennifer Kasule, clinical immunisation coordinator, the HPA and health teams to try to improve local immunisation uptake.

Mark Weston
Mark Weston is an independent policy consultant, researcher and writer. Specialising in international development issues, his work for public and private sector organisations covers a variety of areas, including public health, demography, governance, climate change and corporate social responsibility. He is co-author of the World Economic Forum’s annual HIV/AIDS and Business report.

Disclaimer
The speakers at this event came in a personal capacity to discuss the subject: Modern Vaccines, Modern World. Their contributions were chosen for their value in informing the debate, and do not represent a corporate view of any organisation. None of the speakers received any payment for their involvement in the seminar.